R E P O R T  R E S U M E S

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TECHNICAL EDUCATION.

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THE CONSENSUS OF OUR NATION'S LEADERS AFFIRMS THAT THE COUNTRY'S GREATEST TECHNICAL EDUCATION VOID IS IN THE AREA BETWEEN THE 12TH GRADE AND THE BACCALAUREATE DEGREE. THE IMPACT OF ACCELERATED PROGRESS IN TECHNOLOGICAL ACHIEVEMENTS MAKES TECHNICAL EDUCATION MANDATORY IF THE MANPOWER SHORTAGE IS NOT TO BECOME A NATIONAL EMERGENCY. BECAUSE NEARLY 80 PERCENT OF THE EDUCABLE YOUTH DO NOT PURSUE EDUCATION AT OR BEYOND THE BACCALAUREATE LEVEL, IT IS MOST IMPORTANT THAT HIGH SCHOOL STUDENTS BE GIVEN EVERY OPPORTUNITY TO PREPARE FOR THE WORLD OF WORK WHICH DEMANDS SPECIALIZED SKILLS AND UPDATED TECHNICAL COMPETENCIES. NEW JERSEY NEEDS (1) COUNTY-OPERATED AREA VOCATIONAL-TECHNICAL HIGH SCHOOLS WITH DIVERSIFIED AND BALANCED CURRICULUMS PRESCRIBED BY INDUSTRY'S PLACEMENT DEMANDS, (2) PUBLICALLY CONTROLLED 2-YEAR COUNTY TECHNICAL INSTITUTES WITH CURRICULUMS LEADING TO THE ASSOCIATE DEGREE, AND (3) UTILIZATION OF THESE FACILITIES BY ADULTS WHO NEED TRAINING, UPGRADING, OR RETRAINING. ACCOMPANYING CHARTS SHOW (1) TECHNICAL EDUCATION ENROLLMENTS FROM 1960 TO 1965, (2) MANIPULATIVE, TECHNICAL, AND GENERAL EDUCATION SKILLS NEEDED BY CRAFTSMEN, TECHNICIANS, AND ENGINEERS, (3) SCHOOLS IN NEW JERSEY PRESENTLY OFFERING TECHNICAL CURRICULUMS, (4) ORIENTATION OF EDUCATIONAL LEVELS THROUGH GRADE 12, AND (5) ORIENTATION OF COUNTY COLLEGE EDUCATION IN NEW JERSEY. (EM)

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Dr Cotrell
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State of New Jersey
Department of Education
Vocational Division
Trenton 08625

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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# TECHNICAL EDUCATION

VT 01030

July 1965

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## INTRODUCTION

To become imbued with the desire to acquire a large body of knowledge, for knowledge sake, is a commendable trait, and can yield intrinsic value to the individual. The ability to use such knowledge is a realistic asset which is needed to so adapt the materials and forces of nature as to benefit mankind.

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It should be borne in mind that TECHNICAL EDUCATION looms up as a most significant ingredient needed to engender true progress for all peoples. In essence it is indicative of REALISTIC EDUCATION and TRAINING which yields maximum utilization of both our human and natural resources. Such education may be described as the ORGANIZED PROCESS of fitting one for a technically-oriented calling of his or her preference.

However, inasmuch as those who may seek this kind of training will most assuredly vary in their interests, abilities and drive, great care should be exercised in guiding and in assessing their potential interests and abilities so that appropriate programs may be so designed as to meet the practical objectives of each individual.

In the light of these valid considerations, every effort should be made to provide the system of public education which is specifically attuned to the needs of this accelerating technological era so that both immediate and long-range benefits may be assured.

The total educational effort required is not simple. On the contrary, it becomes rather complex because of the many variables involved and the high order of coordination which is so essential. Even the most modest of

projections into the future forewarn of very competitive and challenging years that must be faced. Of prime consideration, is the realization that the rate and extent of tomorrow's growth must, of necessity, depend on whether or not today's educational preparation will still be adaptable and functional in the years immediately ahead.

The consensus of our nation's leaders affirms that the country's greatest technical education void is in the area which lies between the 12th year of schooling and the professional baccalaureate degree level. The many updated industries seek technicians and technical assistants in large numbers and in view of this are expressing tangible support of the education and training which is so directed.

In the past decade, the worth of TECHNICAL EDUCATION has been truly recognized. It has been stated that ENGINEERING TEAMWORK, rather than brilliance of individual effort alone, is credited with making possible the unprecedented technological progress we are experiencing. Of paramount importance, is the fact that individuals of widely diverse abilities and skills make up the engineering team. Further, it is this team which expedites the application of new technological knowledge to achieve the extensive production of goods and services; and which is comprised of:

1. The ENGINEER and the SCIENTIST who formulate ideas to create new products and services.

2. The ENGINEERING TECHNICIAN who utilizes his broad semi-professional abilities and skills to help develop, test, and apply these ideas and creations.

3. The INDUSTRIAL TECHNICIAN, who's highly specialized abilities and skills are needed to supervise and control the manufacturing and service processes.

4. The CRAFTSMAN, who applies his high-order manipulative skills to shape the components and fabricate the needed structures and appurtenances needed for progress.

5. The SEMI-SKILLED AIDE who performs the several lower order tasks which are in direct support of other members of the team.

Where at least 2 to 5 technicians are needed for every engineer now employed, only seven-tenths (0.7) of a technician is on hand for each of our engineers. The shortage of these semi-professionals will be accentuated since realistic support, in the form of desired physical facilities, is as yet not available . Marked expansion, upgrading and full recognition of vocational-technical education lies in the construction of well situated, appropriately planned, and quality staffed institutions of learning.

## PURPOSE OF TECHNICAL EDUCATION

Technical education dates back to primitive man who for survival had to devise implements and weapons which would insure greater productivity and defense against forces which might tend to destroy him. As simple as they may seem today, in contrast with our modern conveniences, the torch, the club, the hammer, the sling-shot, the bow and arrow, the musket, the wheel, etc. all were early but vital technological contributions.

We have but to gaze around us to realize the unprecedented acceleration which has been taking place in only the last few years. More startling developments are "just around the corner". We cannot remain static. Change we must, for nothing is constant. The aero-space age places a premium on technical abilities and skills.

The Nation, as a whole, has become fully aware of the technological achieve-

PLANNING AHEAD

FOR

# TECHNICAL EDUCATION

Graphical — Technical — Mathematical — Linguistic — **Communication Skills ··Plus·· Manipulative Know-How** — Design — Development — Production — Research

ENGINEERING

HIGHWAY

CONSTRUCTION

DRAFTING AND DESIGN

HEATING AND VENTILATING

ELECTRONIC

ELECTRICAL

POWER PLANT

INSTRUMENTATION

# TECHNICIANS

AUTOMOTIVE

GLASSBLOWING

NUCLEAR

RADIOLOGICAL

BIOLOGICAL

DIETARY

DATA PROCESSING

AGRICULTURAL

METALLURGICAL

Graphic Overview
OF
MAJOR TECHNICAL EDUCATION NEEDS

STATE OF NEW JERSEY
DEPARTMENT OF EDUCATION
VOCATIONAL DIVISION

-Devised By-
Nicholas F. Frigiola, P.E.
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ments and is seriously affected by them since our national economy and security are directly involved. Automation, missiles, atomic power, electronic data computers and processing components, and developments in techniques of instrumentation-all are focusing attention to the dire shortage of highly-skilled technicians who serve as members of the research design, development and production teams of engineers and scientists.

The impact of this accelerated progress is being felt around the world. In view of this, technical education is mandatory if we are to prevent the manpower shortage from looming up as a prime national emergency. Numerous studies by local, state and national agencies clearly emphasize the need for the training of technicians to realistically support the engineers and scientists who now perform in many broad fields.

The technologies, which have been recognized in New Jersey by virtue of the expressed needs established through job analysis surveys, are depicted on the accompanying chart. More will be added as the needs evolve.

KIND OF TRAINING NEEDED

Adequately trained technicians, as well as many trained technical assistants with less depth of preparation, will continue to be in demand in civil production and in military and defense establishments. Most assuredly, they are and will continue to be in demand in all types of private enterprises where flexible instrumentation, reliability standards and research are being accentuated. Further, there is a pronounced need for technicians and technical aides in the medical and health fields; in agriculture and in the areas of distribution and technical sales.

Recognition of the vital need for technical training was made manifest by the action of the 85th Congress of the United States, in 1958, when

the National Defense Education Act was passed and included the now well-known Title VIII programs. The specific objective of these programs was to train highly-skilled technicians in recognized occupations requiring technical and scientific knowledge in fields essential to the national defense. The training programs are designed not only to prepare youths and adults for immediate entrance into waiting technical occupations but also to provide additional updating technical training for persons already employed in technically oriented situations.

Another purpose, of paramount importance, is to encourage the development and expansion of the area concept so that training opportunities may be furnished to qualified persons who would otherwise be deprived of the chance to pursue such training.

A keynoting objective of this training is to provide graduates with a sufficiently broad background which will enable them to qualify for a cluster of related technical occupations. In so doing, the technician becomes a versatile and a most adaptable member of the engineering team. this is the kind of training that is in greatest demand.

## ABOUT THE TECHNICIAN

In general, the technician is a person whose chief interests are directed toward the performance and application of semi-professional functions of an engineering or scientific nature. He operates largely upon his own initiative and under only general supervision of the engineer or scientist; and may serve as a liaison between the professional on the one hand and the skilled craftsman on the other hand. In so doing, it is essential that he be able to communicate linguistically, mathematically, scientifically and graphically.

More specifically, the technician is an individual who is usually identified as a graduate of a two-year, post-high school, technical institute type curriculum which, in essence, shall be comprised of the following:

A - <u>TECHNICAL SCIENCE COURSES</u> - (About 20 semester credits)

Mathematics - Algebra, Trigonometry, Analytical Geometry, Calculus (if needed for the specific technology involved)

Physical Sciences - Physics, Chemistry (Adaptations - To Selected Technical Specialty)

B - <u>TECHNICAL COURSES</u> - (About 40 Semester Credits)

Major Specialty - Specific Study and Experimentations in the Technology Selected

Technical Related Skills - Drafting, Testing of Materials, Manufacturing Techniques, etc.

C - <u>NON-TECHNICAL COURSES</u> - (About 16 Semester Credits)

Communications - English Composition, Speech, Report Writing
Management
Economics
Human Relations and Literature

(The Curriculum is classed as "Terminal" Associate Degree Level)

<u>ON THESE WE BUILD - CRITERIA FOR TECHNICAL EDUCATION PROGRAMS</u>

1. Technical Education is concerned with a specific body of knowledge which is directed toward the preparation for a cluster of related technical or scientific occupational opportunities at the semi-professional level. For many it may serve as an integral part of, or excellent foundation for, advanced studies.

2. Each program calls for the development of broad technical competence in the demanding areas of design, development, production and research.

3. The effectiveness of each program is founded on:

    a. The survey of need which is planned to

ascertain the particular purposes of the technology.

b. The occupational analysis that must, of necessity, determine the curriculum content.

4. The salient placement criteria for the product of the technical education program are:

a. COMMUNICATION ABILITY - Encompassing judgment and skill in interpreting, analyzing, and transmitting facts and ideas linguistically, mathematically, scientifically and graphically in accordance with and to the degree of established need for the technology. It includes, to the extent of about 15% of the curriculum time, such supplementary and supporting general education studies as are appropriate to the attainment of the educational objectives of the program.

b. FACILITY WITH MATHEMATICS - With sufficient breadth and depth to fully meet the requirements of the designed curriculum. "Know-how" in the use of arithmetic, algebra, geometry and trigonometry, is basic to the development of all technical programs. However, a satisfactory understanding of advanced mathematics through application of analytical geometry, calculus and differential equations is most desirable and planned for.

c. PROFICIENCY - In the understanding and application of physical science principles including the concepts and laws which underlie updated physics and chemistry; and in the use of modern highly specialized equipment and control devices involved in the specific technical area of preparation.

d. VERSATILITY - In the planning, installing, testing and maintaining of technical instruments and equipment needed to achieve desired goals.

e. KNOWLEDGE - Of the properties of materials and of processes appropriate to the particular technology.

f. CREATIVENESS AND SELF-RELIANCE - Acquired by virtue of the ability to "think things out" and to complete the assigned projects.

g. PERSONALITY AND ATTITUDE ATTRIBUTES - So essential to all members of the engineering team.

TECHNICAL PROGRAMS AT THE SECONDARY LEVEL - are being expanded to meet the local needs. It should be remembered that the controlling purpose of vocational education is to train individuals for useful employment in occupations for which they are best suited.

In New Jersey, a leading state in the field of research and development, there are many opportunities for placement in technical areas classed as below the technician or semi-professional level. Now, more than ever, there is a continuing need for technical assistants and laboratory aides.

Boys and girls in high school are encouraged to pursue technical curricula which are occupation-centered and many of which have been in vogue over the years. Numerous graduates of such programs will attest to the practical value of the training. Of the greatest importance to these students is the fact that any vocational-technical education and training acquired at the high school level becomes excellent preparation for the pursuit of the more advanced studies at the technical institute or county college level.

OUR GREATEST NEEDS

The unprecedented and accelerating needs for technological advances have placed this nation in a strong competitive position. New Jersey, which is a very important component, must assume its full measure of responsibility by providing, at all necessary cost, the realistic education and

training which will yield the vitally required skilled and technical manpower.

It is a fact that nearly 80 percent of our educable youths do not pursue education at or beyond the baccalaureate level. In view of this, it is most important that high school students be given every opportunity to prepare for the newer and more demanding world of work.

New Jersey possesses sufficient potential to assume a leading role in advancing the economy of our Nation through its many facilities in the fields of research, development and manufacture, as well as, through the utilization of its many natural resources. Our industries are the kind which depend primarily upon highly-skilled craftsmen, technicians, and engineers. An analysis of our work-force and the demands placed upon individuals who answer the call for competent manpower will disclose that the many job descriptions of yesterday are superseded by the anxious demand for those with specialized skills and updated technical competencies.

THE PARAMOUNT NEEDS OF OUR STATE COMPRISE:

1. The construction and operation of a greater number of county-operated area vocational-technical high schools so that the desired training may reach and imbue students to pursue diversified, balanced curricula as prescribed by industry's placement demands.

2. The construction and operation of publicly controlled 2-year county technical institutes (or their full-valued counterparts) which are primarily concerned with the education and training of high school graduates who are desirous of pursuing technical institute type curricula and receiving, upon satisfactory completion, the associate degree.

3. The utilization of these physical facilities for purposes of providing the ever-increasing group of adults with timely vocational-technical education and training so essential to their upgrading or re-training.

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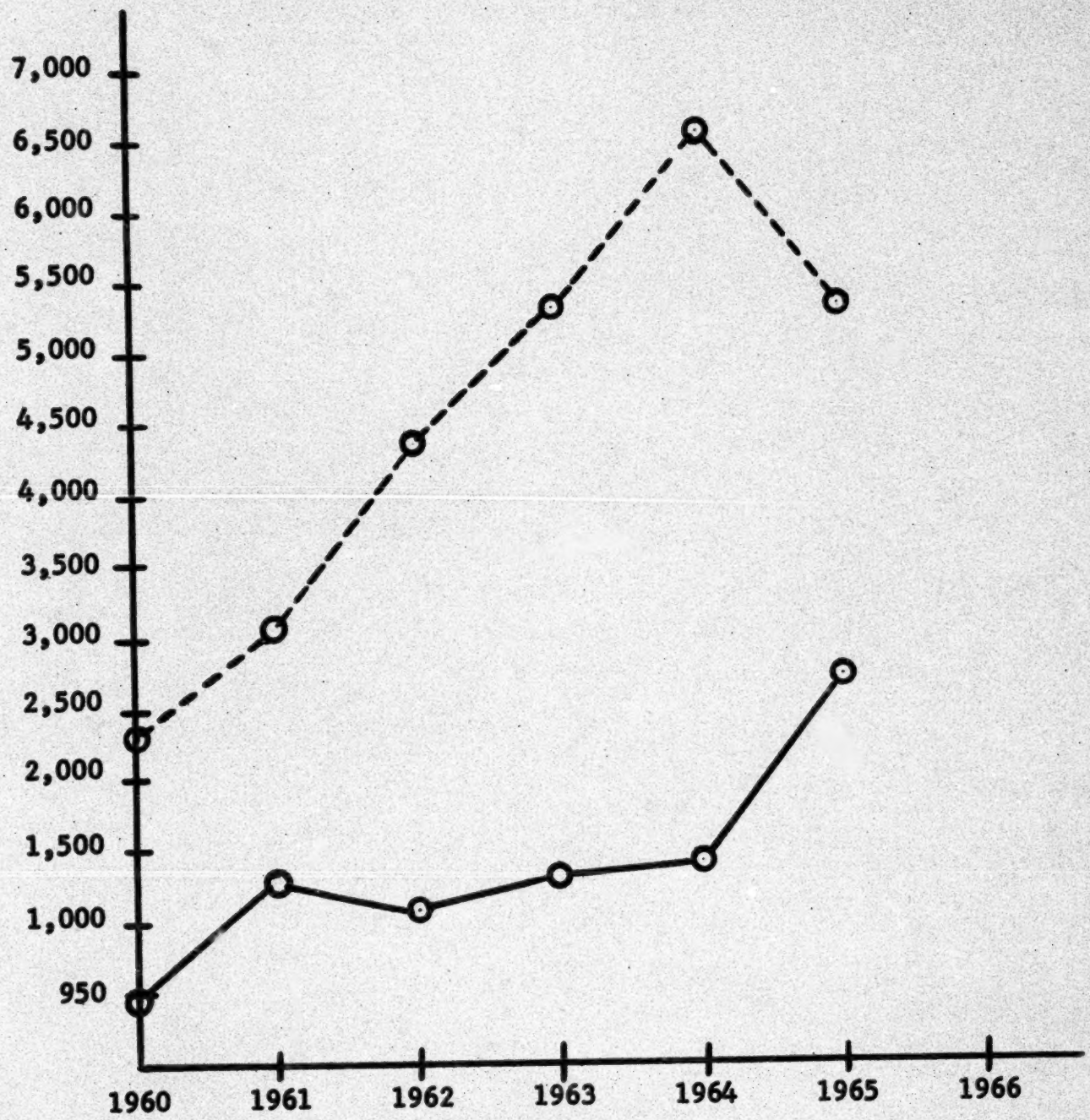
Vocational Division
Trenton 25

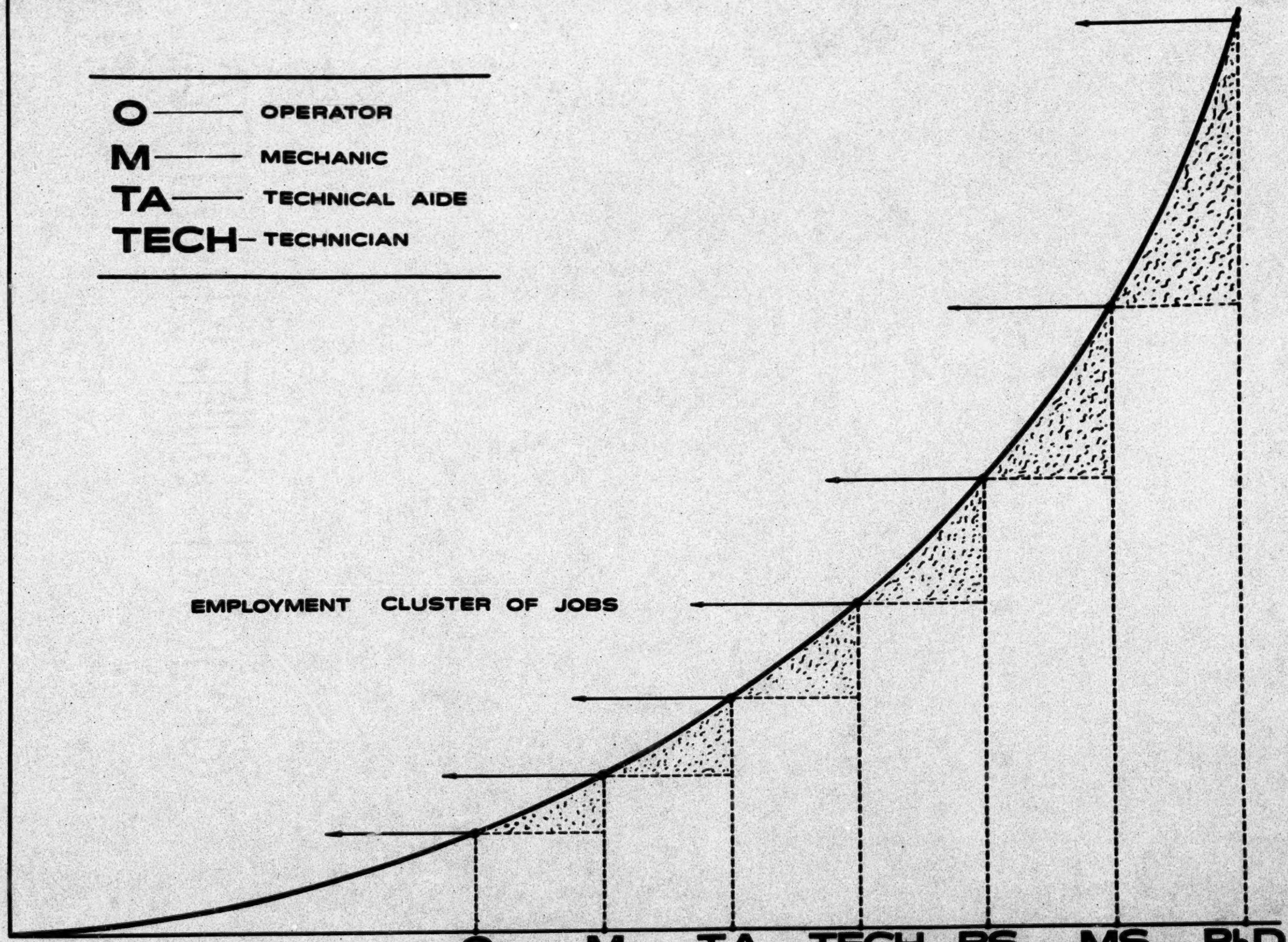



TECHNICAL EDUCATION ENROLLMENTS
1960-1965

PREPARATORY ENROLLMENTS _____

EXTENSION ENROLLMENTS _ _ _

O —— OPERATOR
M —— MECHANIC
TA —— TECHNICAL AIDE
TECH — TECHNICIAN



## THE TECHNICIAN

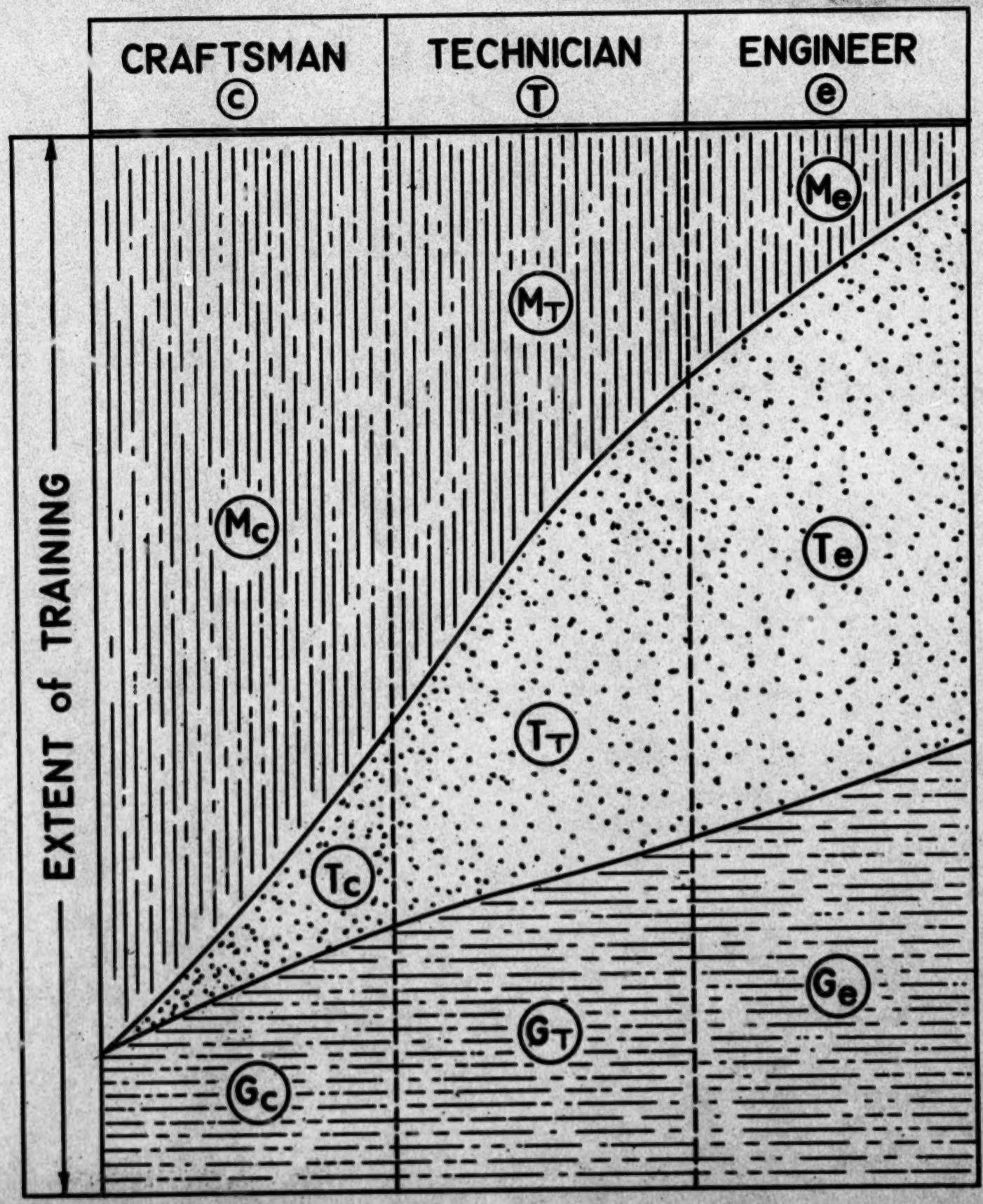
Graphically Oriented
As A Member - Of -
THE TECHNICAL TEAM

### EXTENT of TRAINING

(M) Manipulative Skills

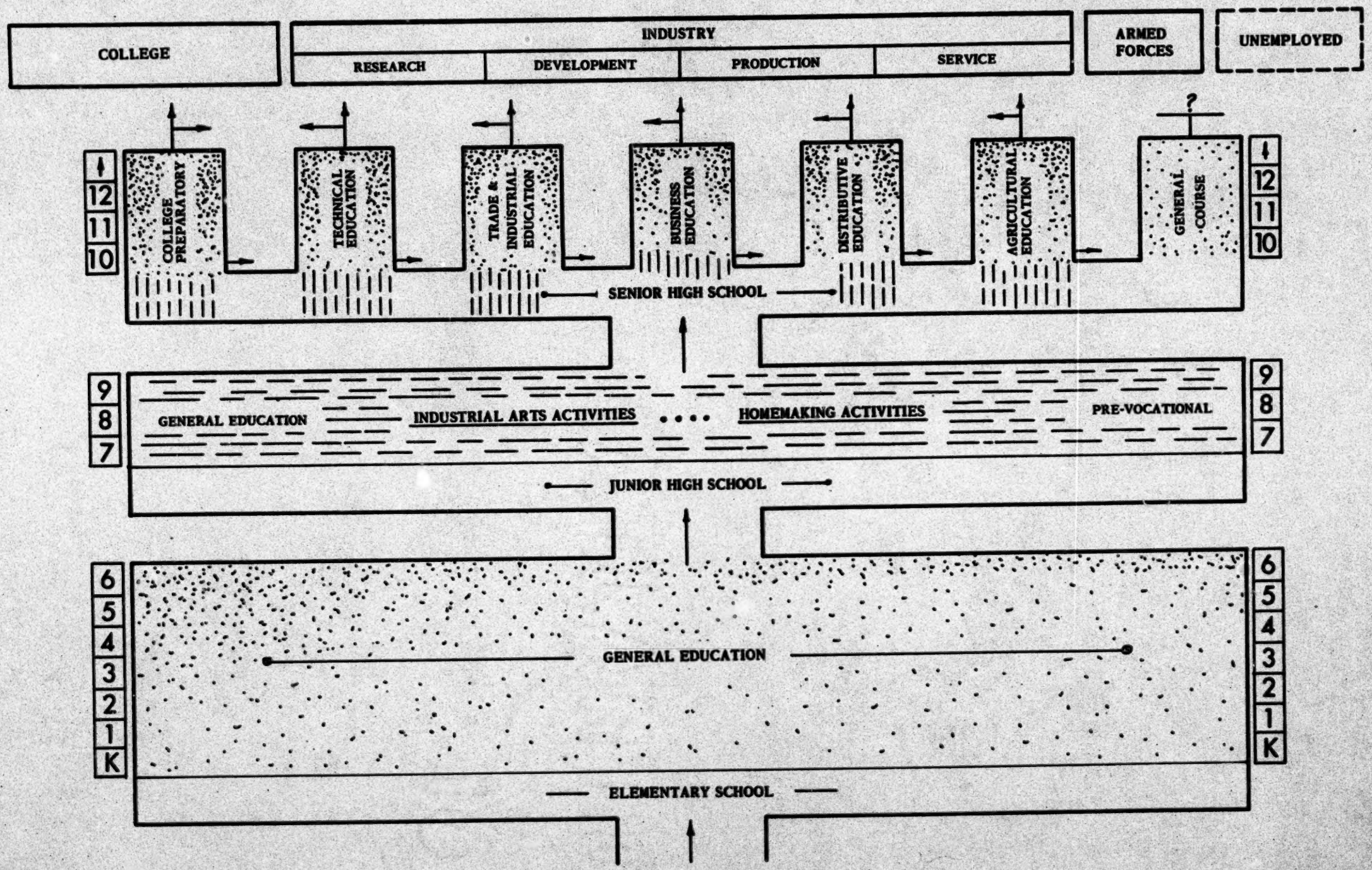
(T) Technical And Scientific Abilities

(G) General Education



| Recognized TECHNOLOGIES \ INSTITUTIONS Publicly Operated | BERGEN COUNTY | BURLINGTON COUNTY | CAMDEN COUNTY | CAPE MAY COUNTY | ESSEX COUNTY Bloomfield | ESSEX COUNTY Irvington | ESSEX COUNTY Newark –Adults– | ESSEX COUNTY Newark –Boys– | MIDDLESEX COUNTY New Brunswick | MIDDLESEX COUNTY Perth Amboy | MONMOUTH COUNTY | OCEAN COUNTY | PATERSON –City– | RUTGERS Univ. N.B. Ext. Ctr. | SALEM COUNTY | SOMERSET COUNTY | SUSSEX COUNTY | UNION COUNTY Mountainside | UNION COUNTY Scotch Plains | WARREN COUNTY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGRICULTURAL | | | | | | | | | | | | | | | | | | | | |
| AUTOMOTIVE | | | | | | | | | | | | | | | | | ◎ | | | |
| BIOLOGICAL | | | | | | | | | | | | | | | | | | | | |
| CHEMICAL – Engineering – | ◎ | | ◎ | | | | | ◎ | | ◎ | | | | | | | | | | |
| CIVIL – Engineering – | | | | | | | | | | | | | | | | | | | | |
| CONSTRUCTION – Building – | | | | | | | | | | | | | | | | ◎ | | | | |
| DATA PROCESSING | | | | | | | | | | | | | | | | | | | ◎ | |
| DIETARY | | | | | | | | | | | | | | | | | | | | |
| DRAFTING & DESIGN | ◎ | ◎ | | ◎ | ◎ | ◎ | | ◎ | ◎ | ◎ | | ◎ | | | ◎ | ◎ | ◎ | ◎ | | ◎ |
| ELECTRICAL – Engineering – | | | | | | | | | | | | | | ◎ | | | | | | |
| ELECTRICAL – Power – | ◎ | | | | ◎ | ◎ | | ◎ | | | | | ◎ | | | | | | | |
| ELECTRONIC | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | | ◎ | ◎ | | ◎ | ◎ | | ◎ | ◎ | ◎ | ◎ | | ◎ |
| GLASSBLOWING – Scientific – | | | | | | | | | | | | | | | ◎ | | | | | |
| HEATING & VENTILATING | | | | | | ◎ | | | ◎ | | | | | | | ◎ | | | | |
| HIGHWAY | | | | | | | | | | | | | | | | | | ◎ | ◎ | |
| INSTRUMENTATION | | | | | | | | | | ◎ | | | | | ◎ | | | | | |
| LIBRARY | | | | | | | | | | | | | | | ◎ | | | | | |
| MECHANICAL – Engineering – | | | | | | | | | | | | | ◎ | ◎ | ◎ | | | | | |
| METALLURGICAL | | | ◎ | | ◎ | ◎ | | ◎ | | | | | | | | | ◎ | | | ◎ |
| NUCLEAR | | | ◎ | | | | | | | | | | | | | | | | | |
| POWER PLANT | | | | | | | | | ◎ | ◎ | | | | | | | | | | |
| RADIOLOGICAL | | | | | | | | | | | | | | | | | | | | |
| FISHERY – Recently Initiated – | | | | ◎ | | | | | | | | | | | | | | | | |

◎ – Now Offered




# ORIENTATION OF THE EDUCATIONAL FIELDS

State of New Jersey
Department of Education
Vocational Division
-By-
Nicholas F. Frigiola
Director of Technical Education

PRIVATE PRACTICE

INDUSTRY

19 | | | | | | | | | | | | | | | | | 19
18 | | | | | | | | | | | | | | | | | 18
17 | | | | | | | | | | | | | | | | | 17

POST GRADUATE EDUCATION
Advanced Degrees

INDUSTRY

INDUSTRY

LEADING TO THE BACCALAUREATE DEGREE

16 | | | | | | | | | | | | | | | 16
15 | | | | | | | | | | | | | | | 15
14 | | | | | | | | | | | | | | | 14
13 | | | | | | | | | | | | | | | 13
C C C C C C C C C C C C C C

FOUR YEAR COLLEGE EDUCATION

| | Leading To The ASSOCIATE DEGREE | | CERTIFICATE | | |
|---|---|---|---|---|---|
| 14 | Liberal Arts | Technical | Liberal Arts | Technical | 14 |
| 13 | Curricula | Curricula | Courses | Courses | 13 |

C C C C C C C C C C C C C C C C

TWO YEAR COUNTY COLLEGE EDUCATION

EMPLOYMENT

ARMED FORCES

HIGH SCHOOL EDUCATION

| 9 | 10 | 11 | 12 |
|---|---|---|---|

GRAMMAR SCHOOL EDUCATION

| K | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|

State Of New Jersey
Department Of Education
Vocational Division

# GRAPHIC ORIENTATION
OF
# COUNTY COLLEGE EDUCATION
IN
# NEW JERSEY